

smooth surface of the metal; and the coefficients of expansion of the two constituents are for all practical purposes identical. The economy of the system in the construction of girders and arches is considerable, owing to the great strength and compactness obtained, and, further, the material is absolutely fire-proof. Large spans may be used for floors, and the small amount of head-room required is a factor often of great value. The system can also be used in situations where brick and stone would be impossible.

It is well known that air-currents containing either drops of water or fine dust in suspension give rise to electrification whenever they impinge on a solid obstacle. M. P. de Heen, guided by the view that electricity, independently of all luminous phenomena, can produce photographic impressions, has tried the experiment of allowing a current of air, laden with *Lycopodium* powder, to fall on a sensitive plate, and the photograph thus obtained is reproduced in the *Bulletin* of the Belgian Academy. With an uncovered plate, a feeble but distinct impression was obtained after one and a half hours, but by using a covered plate a much more powerful impression was produced. The most remarkable feature is that where the covering has been broken away dark ramifications are seen extending some distance into the covered portion, and these appear to follow the directions in which electricity has been propagated along the surface of the plate. In this connection attention may well be directed to the experiments described on p. 269 of this number of NATURE.

THE relative transparency of the alkaline metals to Röntgen rays, forms the subject of a note by Prof. C. Marangoni in the December number of the *Atti dei Lincei*. The author draws the following conclusions: (1) The most transparent metal is lithium, and its transparency does not increase with the thickness; (2) the anomaly of the greater transparency of sodium relative to potassium would suggest that the transparency for these rays is a function of the atomic weight as well as of the density.

It is satisfactory to note that local fishery authorities are becoming increasingly interested in the scientific study of sea fisheries. The Northumberland Sea Fisheries Committee carried out in the summer of 1896 a series of trawling excursions in the bays of its district for the purpose of examining their condition and their productiveness, and a report on the results, drawn up by Mr. Alex. Meek, has been published. Mr. Meek is attached to the Durham College of Science at Newcastle-on-Tyne, and the more deliberate studies of the material collected were carried on in that institution. The report contains interesting details concerning the animals captured in trawl and tow-net, the pelagic eggs, and the food of the fishes.

THE latest instalment of the "Account of the Crustacea of Norway with short descriptions and figures of all the species," which Prof. G. O. Sars is publishing, forms the commencement of vol. ii., and of the description of the Isopoda. The general remarks on the Order only occupy three pages. The classification employed is that adopted by the author in 1882, the Order being divided into six tribes according to the characters of the first pair of legs, of the last pair of appendages (uropoda), and of the five pairs in front of the last (pleopoda). The first tribe, Chelifera, is distinguished by the fact that in its members the legs of the first pair are cheliform, that is, have prehensile claws. Twenty-six species in this tribe are described, and these are figured on sixteen autograph plates.

In the last number of the *Records* of the Geological Survey of India, there is recorded a discovery by Dr. J. W. Evans, which adds another to the long list of geological resemblances between the peninsula and South Africa, and is also of some

economic importance. This is the sedimentary nature of the gold-bearing rocks of Mysore, Dr. Evans having proved that what had been regarded as a quartz vein is in reality a quartzite.

THE following are among the lectures to be delivered at the Royal Victoria Hall, Waterloo Road, during February:—February 2, Mr. H. Bernard, on "Scorpions and their Relations"; February 9, Mr. R. A. Gregory, on "Photography of the Heavens"; February 23, Dr. J. W. Waghorn, "X and other Rays of Light."

THE fiftieth annual general meeting of the Institution of Mechanical Engineers will be held on Thursday and Friday, February 4 and 5. On each occasion the chair will be taken by the President, Mr. E. Windsor Richards. The following papers will be read and discussed, as far as time permits: "Fourth Report to the Alloys Research Committee," by Prof. W. C. Roberts-Austen, C.B., F.R.S. (Thursday); "Partially Immersed Screw-Propellers for Canal Boats; and the influence of Section of Waterway," by Mr. Henry Barcroft (Friday); "Mechanical Propulsion on Canals," by Mr. Leslie S. Robinson, of London (Friday).

THE first number for the current year of the *Biologisches Centralblatt* contains the commencement of an important article, by Dr. T. Bokorny, on the organic nutrition of green plants, and its importance in nature.

NUMBER I of vol. xxxii. of the *Proceedings* of the American Academy of Arts and Sciences is devoted to contributions from the Gray Herbarium of Harvard University, of interest to students of the flora of the United States.

PART XVII. of Dr. R. Braithwaite's "British Moss-Flora" has just been received. It commences Section 8 of this very valuable work, and deals with the Hypnaceae. The two remaining families of Pleurocarpus mosses will be described in future parts.

We have received the Part for December 1896 of the *Agricultural Students' Gazette*, edited by students at the Royal Agricultural College, Cirencester. It contains papers on coffee-planting in British Central Africa; on clearing and preparing forest-land for cane in Queensland; and on experiments on permanent grass on the Lydney Park Estate, Gloucestershire.

MR. STEPHEN MARRIOTT has sent us a little book of his, entitled "To Winnipeg, Manitoba, and Back" (Simpkin, Marshall, and Co.). Though primarily of interest to intending emigrants, it contains much information worth reading; and, in view of the visit of the British Association to Canada this year, should find readers in the scientific world.

THE additions to the Zoological Society's Gardens during the past week include two Patas Monkeys (*Cercopithecus patas*, ♂ ♀) from West Africa, presented by Mr. W. Loy; a Prairie Marmot (*Cynomys ludovicianus*) from North America, presented by Mr. W. Hewlett; two Kestrels (*Tinnunculus alaudarius*), British, presented by Miss Fanny D'Aeth; a Greater Black-backed Gull (*Larus marinus*), British, presented by Mr. W. Theobald; a Pardine Lizard (*Acanthodactylus pardus*), a Scutellated Lizard (*Acanthodactylus scutellatus*) from Biskra, Algeria, presented by Mr. H. B. Hewetson; two Indian Pythons (*Python molurus*) from India, three West African Pythons (*Python sebae*), deposited.

OUR ASTRONOMICAL COLUMN.

COMET PERRINE 1896, DECEMBER 8.—In this column for December 31, 1896, we referred to the striking similarity between the elements of the comet discovered by Mr. Perrine on December 8, and those of the Biela comet. Dr. F. Ristenpart finds, however (*Astr. Nachr.*, No. 3396), that the resem-

blance between these two comets is greater than was at first supposed, the origin of the unsatisfactory large differences for the mean places having been found out. The elliptic elements, which he has now calculated, give us less reason, then, to doubt the probability of a connection between these two comets. Dr. Ristenpart compares his elements with those of comet Biela at the time of its appearance in 1852, but suggests that more observations must be used in the investigation before an accurate value of the eccentricity, and therefore of the period, can be obtained. The comparison is as follows:—

Comet Perrine 1896. τ Nov. 24·7433 B.M.T.	Comet Biela 1852.
ω 163° 57' 30" 5	223 17
Ω 246 24 7·2 } 1897·0	245 51
i 13 50 41·1	12 33
$\log q$ 0·046412	9·9348
$\log e$ 9·843395	9·8784
a 3·676	3·526
U 7·047 years	6·62 years

DOUBLE STAR MEASURES.—Mr. R. G. Aitken communicates to the *Astr. Nachr.*, No. 3395-6, his measurements of double stars during 1895-6 with the 12-inch and 36-inch equatorial telescopes of the Lick Observatory. The majority of the measures were made with the former instrument, but occasionally the 36-inch was used for any crucial test. The selection of objects was restricted; no special search was made for new doubles, and great care was taken to determine the proper quadrant when two stars of nearly equal magnitude were being observed. In the micrometric measurements published, Mr. Aitken gives double weight for observations made with the 36-inch; the position angle is the mean of four or more settings, and the distance that of three double-distances.

The following are some of his remarks on interesting doubles and questionable doubles:—

- OS 65 (Mag. 6·5, 7·0).—Certainly a physical pair, and the plane of the orbit appears to be in the line of sight. Further measures are needed at short intervals.
- H VI 101 δ Tauri (Mag. 4·0, 9·0).—Distance appears to be slowly increasing.
- Σ 634 (Mag. 5·0, 8·+).—Rectilinear motion. Stars are moving in nearly opposite directions. Distance in 1834 was 34", in 1896, 14·75.
- χ 1222.—Examined this star with the 36-inch powers to 1000. Star apparently single (1896·475). Conditions good. "Strongly suspected close double" by H. Looked for by β in 1876 without success. Probably a mistake on the part of H.
- OS 269 (Mag. 6·5, 7·0).—Companion of this rapid binary has completed more than one revolution since the measures of OS. From measures down to 1891, β finds a period of 48·4 years.
- Σ 2026 (Mag. 8·9, 9·0).—Undoubted binary. Angular motion should now become more rapid.
- OS 342. 72 Ophiuchi.—With 36-inch powers 1600. Apparently single (1896·488). Powers to 2600. "No certainty of elongation" (1896·513).
Measured as a close pair by OS and others, but β has always found it single in the last twenty years. Probably the companion is an illusion.
- β 989 x Pegasi (Mag. 5·0, 5·+).—Shortest period of any known binary 11·37 years.

THE CANALS OF MARS.—We have received a communication from Herr M. Teoperberg, of the Hague, in which he submits an explanation of the formation and doubling of the canals on Mars. The idea which he suggests is one that will scarcely recommend itself to astronomers, for, indeed, one assumption cannot reasonably be admitted. The writer supposes a periodical downfall of snow to be the principal agent, taking the undoubted bands as the crests of anticlines, the bases of which may be veiled from the observer by increase of absorption. Such a range, he says, presenting itself as a narrow band, will be doubled if the higher part of the crest be covered with snow. With the advance of the season the snow-covering will extend downwards on the slopes of the ridge, and its margin will at last dip into those strata which escape our observation: the bands will then be lost for a time, reappearing by the inverse process at the next change of season. As another instance of such combinations, he says,

"a synclinal, filled up in winter with snow extending also, but in thinner layers, over the bordering ranges, will present a double band as soon as these more exposed ranges are laid bare by the melting of the snow in summer. They will then change into a single band when the central thicker mass of snow has melted away and replaced either by the dry valley ground or by a drowned *Thalweg*, these recalling the canals *prop. dict.*, differing, however, therefrom by a probably high situation and by the elevated ranges on the sides." Sufficient, however, has been quoted to show that the writer must assume in his hypothesis innumerable ranges of mountains, the highest peaks of which must be singularly placed to give the effect of straight lines or arcs. It is true that horizontal sections of mountains become more simplified the greater the elevation, and that gaps of considerable magnitude would escape observation, but even then the mountainous conditions on Mars would be very extraordinary. If such were the case, the "flashings" would be very much more numerous than they are, and the colour phenomena would probably be different from what observations tell us. The hypothesis of "vegetation" seems still to be the most satisfactory explanation for these curious canal-like markings, although even this cannot satisfy all the observed phenomena.

THE CLASSIFICATION OF MADREPORARIA.

AT present the classification of Madreporarian corals is admitted to be in an unsatisfactory condition. A fair standard of the opinion of the time can be obtained by reference to Prof. Nicholson's "Manual of Palæontology," or to Prof. von Zittel's new "Student's Text-book of Palæontology." One of the most striking features is the insecurity which is now felt about the sub-orders of Milne Edwards and Haime, the *M. Rugosa* = *Tetracoralla* (Haeckel), and the *M. Aporosa* and *Perforata* = *Hexacoralla* (Haeckel). Yet the authorities just named think it best to maintain these sub-orders provisionally.

I propose here to give a short sketch of some work of mine on corals, which was entered at the Royal Society of London in July 1895. It deals with the "Microscopic and Systematic Study of Madreporaria," and covers a rather wide field:—

(1) Numerous sections of the skeleton of living corals are examined and figured, all controversial points with regard to the structure of skeletal parts are exhaustively discussed, and my own views are advanced regarding microscopic structure, and the relation of the soft parts of the polyp to the skeleton.

(2) A comparative account is given of the fossil skeleton in the various families. In this part I have been greatly aided by the results of my special work on corals of Upper Jurassic age, "*Stramberger Korallen*," to be published next month in the *Paläontologische Mittheilungen* (Stuttgart).

(3) The determination of the main evolutionary changes within Madreporaria.

(4) Systematic results.

General Microscopy of the Skeleton.

The basal "tabula" or "dissepiment" forming the floor of the calyx presents us with the simplest form of septal structure in Madreporarian corals. Microscopically examined, it proves to be a compact series of calcareous lamellæ, each of which is made up of minute, crystalline, needle-shaped fibres, set perpendicularly to the lamellar surface. The fibro-crystals are oriented in one and the same direction throughout the whole thickness of lamellæ, hence they behave in the same way towards light. The appearance under the microscope is that of long fibres running through the lamellæ, but crossed by a dark and light band in each lamella (Fig. 1). These bands are wavy, not straight in section, and a special group of tiny fibres is present within each "wave." The solid dimensions of such a fibrous wave-unit or "scale" (Fig. 2) of the lamella agrees with those of a single ectodermal cell of the polyp. The wave-units of the lamellar surface indicate the original cell-units, whose protoplasmic contents have been changed to crystalline fibres. Still, however, some fragments of organic matter and dirt particles usually remain, and their decomposition gives rise to the dark spots and bands which blur the crystalline deposit.

The structure just described for the calcareous floor of the coral calyx repeats itself throughout all parts of the skeletal